

WHAT IS THE CIRCUMFERENCE OF A CIRCLE CIRCUMCISED AROUND A RECTANGLE WITH SIDES 7 CM AND 24 CM

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UNDERSTANDING THE PROPERTIES OF CIRCLES AND RECTANGLES IS FUNDAMENTAL IN GEOMETRY, ESPECIALLY WHEN THESE SHAPES INTERACT IN VARIOUS CONFIGURATIONS. ONE INTRIGUING QUESTION IS HOW TO DETERMINE THE CIRCUMFERENCE OF A CIRCLE THAT IS "CIRCUMCISED" OR CIRCUMSCRIBED AROUND A RECTANGLE WITH SPECIFIC DIMENSIONS—IN THIS CASE, SIDES MEASURING 7 CM AND 24 CM. THIS ARTICLE EXPLORES THIS QUESTION IN DETAIL, PROVIDING A COMPREHENSIVE EXPLANATION, RELEVANT FORMULAS, AND STEP-BY-STEP CALCULATIONS TO HELP YOU GRASP THE CONCEPT THOROUGHLY.

UNDERSTANDING THE KEY CONCEPTS

BEFORE DELVING INTO THE CALCULATIONS, IT'S ESSENTIAL TO CLARIFY SOME FUNDAMENTAL GEOMETRIC CONCEPTS INVOLVED IN THIS PROBLEM.

WHAT IS A CIRCUMSCRIBED CIRCLE?

A CIRCUMSCRIBED CIRCLE (OR CIRCUMCIRCLE) OF A POLYGON IS A CIRCLE THAT PASSES THROUGH ALL THE VERTICES OF THAT POLYGON. FOR POLYGONS LIKE TRIANGLES AND RECTANGLES, THE CIRCUMSCRIBED CIRCLE IS UNIQUE IF IT EXISTS.

- IN THE CASE OF A RECTANGLE, THE CIRCUMSCRIBED CIRCLE ALWAYS EXISTS BECAUSE ALL FOUR VERTICES LIE ON A CIRCLE—MAKING THE RECTANGLE A CYCLIC QUADRILATERAL. THIS CIRCLE IS CALLED THE CIRCUMCIRCLE OF THE RECTANGLE.

PROPERTIES OF A RECTANGLE AND ITS CIRCUMCIRCLE

- THE DIAGONALS OF A RECTANGLE ARE EQUAL IN LENGTH AND BISECT EACH OTHER.
- THE DIAGONALS ALSO ACT AS THE DIAMETERS OF THE CIRCUMSCRIBED CIRCLE BECAUSE THEY PASS THROUGH THE CENTER AND CONNECT OPPOSITE VERTICES.
- THE RADIUS OF THIS CIRCLE IS HALF THE LENGTH OF THE RECTANGLE'S DIAGONAL.

RELEVANCE OF THE RECTANGLE'S DIMENSIONS

GIVEN THE SIDES OF THE RECTANGLE (7 CM AND 24 CM), THE KEY TO DETERMINING THE CIRCUMFERENCE OF THE CIRCUMSCRIBED CIRCLE IS UNDERSTANDING THE LENGTH OF THE DIAGONAL, WHICH BECOMES THE DIAMETER OF THE CIRCLE.

CALCULATING THE DIAGONAL OF THE RECTANGLE

THE FIRST STEP IN FINDING THE CIRCUMFERENCE OF THE CIRCUMSCRIBED CIRCLE IS TO CALCULATE THE LENGTH OF THE RECTANGLE'S DIAGONAL.

APPLYING THE PYTHAGOREAN THEOREM

THE DIAGONAL ((D)) OF A RECTANGLE WITH SIDES ((A)) AND ((B)) CAN BE CALCULATED USING THE PYTHAGOREAN THEOREM:

$$D = \sqrt{A^2 + B^2}$$

WHERE:

- ($A = 7$, cm)
- ($B = 24$, cm)

CALCULATING:

$$D = \sqrt{(7)^2 + (24)^2} = \sqrt{49 + 576} = \sqrt{625}$$

$$D = 25, \text{cm}$$

THUS, THE DIAGONAL OF THE RECTANGLE MEASURES 25 CENTIMETERS.

DETERMINING THE CIRCUMFERENCE OF THE CIRCUMSCRIBED CIRCLE

SINCE THE DIAGONAL ACTS AS THE DIAMETER OF THE CIRCUMSCRIBED CIRCLE, WE CAN PROCEED TO CALCULATE THE CIRCLE'S CIRCUMFERENCE.

CIRCLE CIRCUMFERENCE FORMULA

THE CIRCUMFERENCE ((C)) OF A CIRCLE IS GIVEN BY:

$$C = \pi \times D$$

WHERE:

- (D) IS THE DIAMETER OF THE CIRCLE.
- (π) (π) IS APPROXIMATELY 3.1416.

IN THIS CASE:

$$C = \pi \times 25, \text{cm}$$

$$C \approx 3.1416 \times 25 = 78.54, \text{cm}$$

\]

THEREFORE, THE CIRCUMFERENCE OF THE CIRCLE CIRCUMSCRIBED AROUND THE RECTANGLE IS APPROXIMATELY 78.54 CENTIMETERS.

SUMMARY OF THE CALCULATION STEPS

1. IDENTIFY THE RECTANGLE'S DIMENSIONS: 7 CM AND 24 CM.
2. CALCULATE THE DIAGONAL USING THE PYTHAGOREAN THEOREM:

\[

$$D = \sqrt{7^2 + 24^2} = 25, \text{ \text{cm}}$$

\]

3. DETERMINE THE DIAMETER OF THE CIRCUMSCRIBED CIRCLE: SAME AS THE DIAGONAL, 25 CM.
4. CALCULATE THE CIRCLE'S CIRCUMFERENCE:

\[

$$C = \pi \times 25 \approx 78.54, \text{ \text{cm}}$$

\]

ADDITIONAL CONSIDERATIONS AND RELATED CONCEPTS

WHILE THE ABOVE CALCULATION PROVIDES THE MAIN ANSWER, IT'S USEFUL TO EXPLORE RELATED IDEAS AND POTENTIAL VARIATIONS.

WHAT IF THE RECTANGLE WERE NOT A CYCLIC QUADRILATERAL?

IN THE CASE OF A RECTANGLE, THE PROPERTY THAT THE DIAGONALS ARE EQUAL AND PASS THROUGH THE CENTER ENSURES THAT A CIRCUMSCRIBED CIRCLE ALWAYS EXISTS. HOWEVER, FOR OTHER QUADRILATERALS, THIS MAY NOT BE TRUE, AND THE EXISTENCE OF A CIRCUMSCRIBED CIRCLE DEPENDS ON SPECIFIC PROPERTIES.

OTHER SHAPES AND THEIR CIRCUMCIRCLES

- TRIANGLES: ALL TRIANGLES HAVE A UNIQUE CIRCUMSCRIBED CIRCLE IF ALL THREE VERTICES ARE ON A CIRCLE.
- IRREGULAR QUADRILATERALS: NOT ALL HAVE A CIRCUMSCRIBED CIRCLE; IT DEPENDS ON THE ANGLES AND SIDE LENGTHS.

APPLICATIONS OF CIRCUMSCRIBED CIRCLES

UNDERSTANDING THE PROPERTIES OF CIRCUMSCRIBED CIRCLES HAS APPLICATIONS IN VARIOUS FIELDS:

- ENGINEERING AND DESIGN: ENSURING COMPONENTS FIT WITHIN CERTAIN CIRCULAR BOUNDS.
- NAVIGATION AND MAPPING: CALCULATING COVERAGE AREAS.
- MATHEMATICS EDUCATION: TEACHING FUNDAMENTAL GEOMETRIC CONCEPTS.

PRACTICAL EXAMPLES AND REAL-WORLD APPLICATIONS

KNOWING HOW TO CALCULATE THE CIRCUMFERENCE OF A CIRCUMSCRIBED CIRCLE AROUND A RECTANGLE CAN BE USEFUL IN SEVERAL PRACTICAL SCENARIOS:

- DESIGNING CIRCULAR FRAMES: WHEN CREATING A CIRCULAR FRAME AROUND A RECTANGULAR PICTURE OR OBJECT.
- MATERIAL CUTTING: DETERMINING THE LENGTH OF MATERIAL NEEDED TO ENCIRCLE A RECTANGULAR OBJECT.
- ROBOTICS AND AUTOMATION: CALCULATING MOVEMENT PATHS AROUND RECTANGULAR OBSTACLES.

CONCLUSION

IN SUMMARY, TO FIND THE CIRCUMFERENCE OF THE CIRCLE CIRCUMSCRIBED AROUND A RECTANGLE WITH SIDES MEASURING 7 CM AND 24 CM:

- CALCULATE THE DIAGONAL USING THE PYTHAGOREAN THEOREM.
- RECOGNIZE THAT THE DIAGONAL ACTS AS THE DIAMETER OF THE CIRCUMSCRIBED CIRCLE.
- USE THE CIRCLE CIRCUMFERENCE FORMULA $(C = \pi \times d)$.

THIS PROCESS YIELDS A CIRCUMFERENCE OF APPROXIMATELY 78.54 CENTIMETERS. UNDERSTANDING THESE GEOMETRIC PRINCIPLES NOT ONLY HELPS SOLVE SPECIFIC PROBLEMS BUT ALSO ENHANCES OVERALL SPATIAL REASONING AND MATHEMATICAL LITERACY.

KEY TAKEAWAYS

- THE DIAGONAL OF A RECTANGLE WITH SIDES 7 CM AND 24 CM IS 25 CM.
- THE CIRCUMSCRIBED CIRCLE'S DIAMETER EQUALS THE RECTANGLE'S DIAGONAL.
- THE CIRCUMFERENCE OF THIS CIRCLE IS APPROXIMATELY 78.54 CM.
- THE PROPERTIES OF RECTANGLES ENSURE THE EXISTENCE OF SUCH A CIRCUMSCRIBED CIRCLE, MAKING THESE CALCULATIONS UNIVERSALLY APPLICABLE FOR RECTANGLES.

IF YOU WANT TO EXPLORE MORE ABOUT GEOMETRY, SHAPES, AND THEIR PROPERTIES, CONSIDER STUDYING TOPICS SUCH AS INSCRIBED AND CIRCUMSCRIBED POLYGONS, PROPERTIES OF TRIANGLES, AND THE PYTHAGOREAN THEOREM. THESE FOUNDATIONAL CONCEPTS ARE ESSENTIAL IN BOTH ACADEMIC AND REAL-WORLD APPLICATIONS, MAKING UNDERSTANDING THEM VALUABLE FOR STUDENTS, PROFESSIONALS, AND ENTHUSIASTS ALIKE.

FREQUENTLY ASKED QUESTIONS

WHAT IS THE PRIMARY GEOMETRIC CONCEPT INVOLVED IN CALCULATING THE

CIRCUMFERENCE OF A CIRCLE AROUND A RECTANGLE?

THE PRIMARY CONCEPT IS UNDERSTANDING THE RELATIONSHIP BETWEEN THE RECTANGLE'S DIMENSIONS AND THE CIRCLE'S RADIUS, SPECIFICALLY HOW TO DETERMINE THE CIRCLE THAT CIRCUMSCRIBES THE RECTANGLE AND THEN CALCULATE ITS CIRCUMFERENCE.

HOW DO YOU FIND THE RADIUS OF A CIRCLE THAT CIRCUMSCRIBES A RECTANGLE WITH SIDES 7 CM AND 24 CM?

THE RADIUS IS HALF THE LENGTH OF THE RECTANGLE'S DIAGONAL. FIRST, CALCULATE THE DIAGONAL USING THE PYTHAGOREAN THEOREM: $\text{DIAGONAL} = \sqrt{7^2 + 24^2} = \sqrt{49 + 576} = \sqrt{625} = 25$ CM. THEN, THE RADIUS IS HALF OF THAT: $25 / 2 = 12.5$ CM.

WHAT IS THE FORMULA FOR CALCULATING THE CIRCUMFERENCE OF A CIRCLE GIVEN ITS RADIUS?

THE FORMULA IS $C = 2\pi r$, WHERE C IS THE CIRCUMFERENCE AND r IS THE RADIUS OF THE CIRCLE.

USING THE RECTANGLE'S DIAGONAL AS THE CIRCLE'S DIAMETER, WHAT IS THE CIRCUMFERENCE OF THE CIRCUMSCRIBED CIRCLE AROUND THE RECTANGLE?

THE DIAMETER IS 25 CM (THE DIAGONAL). THE RADIUS IS 12.5 CM. THEREFORE, $\text{CIRCUMFERENCE} = 2\pi \times 12.5 \approx 2 \times 3.1416 \times 12.5 \approx 78.54$ CM.

WHY IS THE DIAGONAL OF THE RECTANGLE IMPORTANT IN DETERMINING THE CIRCUMSCRIBED CIRCLE'S CIRCUMFERENCE?

BECAUSE THE CIRCLE THAT CIRCUMSCRIBES A RECTANGLE PASSES THROUGH ALL FOUR VERTICES, ITS DIAMETER EQUALS THE RECTANGLE'S DIAGONAL. KNOWING THE DIAGONAL ALLOWS US TO FIND THE RADIUS AND THUS CALCULATE THE CIRCUMFERENCE.

CAN THE CIRCUMFERENCE OF THE CIRCUMSCRIBED CIRCLE BE APPROXIMATED WITHOUT CALCULATING THE DIAGONAL?

NO, BECAUSE THE DIAGONAL IS ESSENTIAL TO DETERMINE THE CIRCLE'S RADIUS. WITHOUT IT, YOU CANNOT ACCURATELY FIND THE CIRCLE THAT PASSES THROUGH ALL FOUR VERTICES OF THE RECTANGLE, WHICH IS NECESSARY FOR COMPUTING ITS CIRCUMFERENCE.

ADDITIONAL RESOURCES

WHAT IS THE CIRCUMFERENCE OF A CIRCLE CIRCUMCISED AROUND A RECTANGLE WITH SIDES 7 CM AND 24 CM

UNDERSTANDING GEOMETRIC FIGURES AND THEIR PROPERTIES CAN OFTEN SEEM DAUNTING, ESPECIALLY WHEN DEALING WITH SHAPES LIKE CIRCLES AND RECTANGLES. IN PARTICULAR, QUESTIONS SUCH AS "WHAT IS THE CIRCUMFERENCE OF A CIRCLE CIRCUMSCRIBED AROUND A RECTANGLE WITH SIDES 7 CM AND 24 CM?" INVITE US TO EXPLORE THE FASCINATING RELATIONSHIPS BETWEEN DIFFERENT GEOMETRIC SHAPES. THIS ARTICLE AIMS TO DEMYSTIFY THIS PROBLEM, WALKING THROUGH THE FUNDAMENTAL CONCEPTS, CALCULATIONS, AND RELEVANT CONSIDERATIONS TO HELP YOU GRASP THE COMPLETE PICTURE.

UNDERSTANDING THE BASIC CONCEPTS

BEFORE DELVING INTO THE CALCULATIONS, IT IS ESSENTIAL TO CLARIFY THE KEY GEOMETRIC TERMS INVOLVED:

WHAT IS A CIRCUMSCRIBED CIRCLE?

A CIRCUMSCRIBED CIRCLE (OR CIRCUMCIRCLE) OF A POLYGON IS A CIRCLE THAT PASSES THROUGH ALL THE VERTICES OF THE POLYGON. FOR A RECTANGLE, WHICH IS A SPECIAL TYPE OF QUADRILATERAL WITH RIGHT ANGLES AND OPPOSITE SIDES EQUAL, THE CIRCUMSCRIBED CIRCLE IS THE CIRCLE THAT TOUCHES ALL FOUR CORNERS.

PROPERTIES OF A RECTANGLE AND ITS CIRCUMCIRCLE

- THE DIAGONALS OF A RECTANGLE ARE EQUAL IN LENGTH.
- THE DIAGONAL OF THE RECTANGLE SERVES AS THE DIAMETER OF THE CIRCUMSCRIBED CIRCLE.
- THE CENTER OF THE CIRCUMSCRIBED CIRCLE COINCIDES WITH THE INTERSECTION POINT OF THE DIAGONALS.

CALCULATING THE DIAGONAL OF THE RECTANGLE

THE FIRST STEP IN DETERMINING THE CIRCUMFERENCE OF THE CIRCUMSCRIBED CIRCLE IS TO FIND THE LENGTH OF THE RECTANGLE'S DIAGONAL, AS IT WILL BE THE DIAMETER OF THE CIRCLE.

APPLYING THE PYTHAGOREAN THEOREM

GIVEN THE SIDES OF THE RECTANGLE (7 CM AND 24 CM), THE DIAGONAL (D) CAN BE CALCULATED USING THE PYTHAGOREAN THEOREM:

$$D = \sqrt{(7)^2 + (24)^2}$$

CALCULATING:

$$D = \sqrt{49 + 576} = \sqrt{625} = 25, \text{ cm}$$

SO, THE DIAGONAL OF THE RECTANGLE MEASURES 25 CM.

DETERMINING THE RADIUS OF THE CIRCUMSCRIBED CIRCLE

SINCE THE DIAGONAL OF THE RECTANGLE IS THE DIAMETER OF THE CIRCUMSCRIBED CIRCLE, THE RADIUS (R) IS HALF OF THE DIAGONAL:

$$R = \frac{D}{2} = \frac{25, \text{ cm}}{2} = 12.5, \text{ cm}$$

THIS RADIUS IS CRUCIAL FOR CALCULATING THE CIRCLE'S CIRCUMFERENCE.

CALCULATING THE CIRCUMFERENCE OF THE CIRCLE

THE CIRCUMFERENCE (C) OF A CIRCLE IS GIVEN BY THE FORMULA:

$$C = 2\pi r$$

SUBSTITUTING $(r = 12.5, \text{cm})$:

$$C = 2 \times \pi \times 12.5, \text{cm} = 25\pi, \text{cm}$$

USING THE APPROXIMATE VALUE OF $(\pi \approx 3.1416)$:

$$C \approx 25 \times 3.1416 = 78.54, \text{cm}$$

THEREFORE, THE CIRCUMFERENCE OF THE CIRCLE CIRCUMSCRIBED AROUND THE RECTANGLE WITH SIDES 7 CM AND 24 CM IS APPROXIMATELY 78.54 CENTIMETERS.

KEY FEATURES AND INSIGHTS

UNDERSTANDING THE PROCESS ABOVE PROVIDES VALUABLE INSIGHTS INTO GEOMETRIC RELATIONSHIPS:

- THE DIAGONAL OF A RECTANGLE IS ALWAYS THE DIAMETER OF ITS CIRCUMSCRIBED CIRCLE.
- THE SIZE OF THE RECTANGLE'S SIDES IMPACTS THE DIAGONAL LENGTH, WHICH IN TURN DETERMINES THE CIRCLE'S SIZE.
- FOR RECTANGLES WITH DIFFERENT DIMENSIONS, THE SAME METHOD APPLIES, HIGHLIGHTING THE UNIVERSALITY OF THE PYTHAGOREAN THEOREM.

POTENTIAL VARIATIONS AND RELATED CALCULATIONS

WHILE THIS SPECIFIC PROBLEM DEALS WITH A RECTANGLE WITH SIDES 7 CM AND 24 CM, SIMILAR CALCULATIONS CAN EXTEND TO OTHER SHAPES AND CONFIGURATIONS:

DIFFERENT RECTANGLE DIMENSIONS

- FOR A RECTANGLE WITH SIDES (a) AND (b) :

$$D = \sqrt{a^2 + b^2}$$

\]

THE CIRCUMFERENCE THEN BECOMES:

\[

$$C = \pi \sqrt{A^2 + B^2}$$

\]

OTHER SHAPES AND CIRCUMSCRIBED CIRCLES

- FOR TRIANGLES, THE CIRCUMSCRIBED CIRCLE DEPENDS ON DIFFERENT PROPERTIES, SUCH AS THE TRIANGLE'S SIDE LENGTHS AND ANGLES.
- FOR POLYGONS WITH MORE THAN FOUR SIDES, THE PROCESS INVOLVES MORE COMPLEX CALCULATIONS, OFTEN REQUIRING KNOWLEDGE OF THE POLYGON'S VERTICES AND ANGLES.

PROS AND CONS OF USING CIRCUMFERENCE CALCULATIONS IN GEOMETRY

UNDERSTANDING HOW TO COMPUTE THE CIRCUMFERENCE OF A CIRCUMSCRIBED CIRCLE OFFERS SEVERAL ADVANTAGES BUT ALSO HAS LIMITATIONS:

PROS:

- PROVIDES A DIRECT LINK BETWEEN LINEAR DIMENSIONS AND CIRCULAR PROPERTIES.
- HELPS IN VISUALIZING AND UNDERSTANDING GEOMETRIC RELATIONSHIPS.
- USEFUL IN REAL-WORLD APPLICATIONS SUCH AS ENGINEERING, ARCHITECTURE, AND DESIGN.

CONS:

- ASSUMES PERFECT GEOMETRIC FIGURES; REAL-WORLD SHAPES MAY BE IRREGULAR.
- REQUIRES UNDERSTANDING OF ADVANCED CONCEPTS LIKE THE PYTHAGOREAN THEOREM.
- IN SOME CASES, THE DATA NEEDED (LIKE PRECISE VERTEX POSITIONS) MAY NOT BE READILY AVAILABLE.

PRACTICAL APPLICATIONS OF THIS CALCULATION

KNOWING THE CIRCUMFERENCE OF A CIRCUMSCRIBED CIRCLE AROUND A RECTANGLE CAN BE USEFUL IN VARIOUS FIELDS:

- ENGINEERING AND MANUFACTURING: DESIGN OF MECHANICAL PARTS OR COMPONENTS THAT NEED TO FIT WITHIN CIRCULAR BOUNDARIES.
- ARCHITECTURE: PLANNING CIRCULAR ELEMENTS AROUND RECTANGULAR STRUCTURES.
- EDUCATIONAL SETTINGS: TEACHING FUNDAMENTAL GEOMETRIC PRINCIPLES AND PROBLEM-SOLVING TECHNIQUES.
- ART AND DESIGN: CREATING PATTERNS OR FRAMES THAT INVOLVE COMBINING RECTANGULAR AND CIRCULAR SHAPES.

CONCLUSION

IN SUMMARY, THE QUESTION "WHAT IS THE CIRCUMFERENCE OF A CIRCLE CIRCUMSCRIBED AROUND A RECTANGLE WITH SIDES 7 CM AND 24 CM?" LEADS US THROUGH AN ELEGANT APPLICATION OF THE PYTHAGOREAN THEOREM AND BASIC CIRCLE GEOMETRY. BY CALCULATING THE DIAGONAL OF THE RECTANGLE TO FIND THE CIRCLE'S DIAMETER, THEN DERIVING THE RADIUS AND

ULTIMATELY THE CIRCUMFERENCE, WE ARRIVE AT A PRECISE ANSWER: APPROXIMATELY 78.54 CM.

THIS PROCESS EXEMPLIFIES THE INTERCONNECTEDNESS OF GEOMETRIC PRINCIPLES AND DEMONSTRATES HOW FUNDAMENTAL FORMULAS CAN UNLOCK SOLUTIONS TO SEEMINGLY COMPLEX PROBLEMS. WHETHER FOR ACADEMIC PURPOSES, PRACTICAL APPLICATIONS, OR SIMPLY EXPANDING YOUR MATHEMATICAL UNDERSTANDING, MASTERING THESE CALCULATIONS EQUIPS YOU WITH ESSENTIAL TOOLS FOR EXPLORING THE SHAPES AND STRUCTURES THAT MAKE UP OUR WORLD.

FINAL NOTE: ALWAYS REMEMBER TO VERIFY YOUR MEASUREMENTS AND CALCULATIONS, ESPECIALLY WHEN APPLYING THESE PRINCIPLES TO REAL-WORLD SCENARIOS, WHERE SLIGHT DEVIATIONS CAN LEAD TO SIGNIFICANT DIFFERENCES IN OUTCOMES.

What Is The Circumference Of A Circle Circumcised Around A Rectangle With Sides 7 Cm And 24 Cm

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